

AMSIC Newsletter

March 2024
Issue 14

Published by the African Membrane Society in two issues yearly.



AMSIC invites you to its 4th congress

**Addis Ababa, Ethiopia
November 5-8, 2024**

Highlights

Front Page 2
Organisation Spotlight 4
Regional Updates 5
AMSIC Organisation 15
Highlights AMSIC Researchers ... 27



Editorial note by Soraya Phumzile MALINGA

Associate Professor and Researcher at the University of Johannesburg - South Africa

AMSIC co-Director of Communication

It is indeed a great pleasure to be part of the Editorial note for the AMSIC newsletter Issue 14. As we all look forward to new possibilities, new resolutions, and great success in the different areas of your research, we wish you the very best for 2024!

This first issue of 2024 illustrates stories of fruitful collaborations between AMSIC members and their research partners. In Southern Africa, we highlight an important partnership between Professor Heidi RICHARDS and Assistant Professor Aamer ALI from Denmark, as they seek to recover freshwater via membrane distillation. Another proof of this growing collaboration between the European Membrane Society and AMSIC is evidenced by the visit of Dr. Maryam Khadim MBACKE from *Université Amadou Mahtar Mbow de Dakar, Sénégal*, to *Université de Rennes 1 (France)*, in Prof. Anthony SZYMCZYK's laboratory.



On the entrepreneurial front, we feature Dr Moustapha SENE, founder and CEO of SenEngineering (Dakar, Sénégal), a provider of water treatment technologies and consulting services for West Africa. We also report on another Europe-Africa success story resulting from academe-industry and business-to-business engagements, with the testing of DONYATEK's new sand filters fabricated in Mali, by IFTS company located in Agen (France).

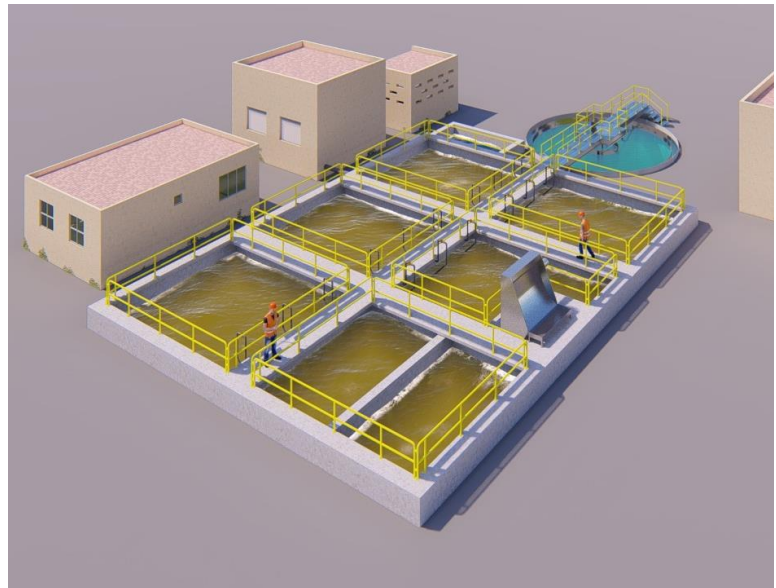
We congratulate Dr. Lumami Vercus KAPEPULA (UCLouvain University, Belgium) and Dr. Abdulrahman Babatunde AMEEN (Llorin state, Nigeria) for completing their PhD defense, which addressed key clean water supply challenges in Africa. We are delighted to share Ms Rita Namoe TABI's update, a doctoral student from Ghana, who has been awarded a mobility grant for pursuing her studies at the *Institut Européen des Membranes* of Montpellier (France). We also acknowledge the noticeable contribution of early career researchers who are very active in the field of membrane science, such as Professor Ayman ELGENDI (AMSIC Director of New Talent and Leadership Committee, Vice Dean of the Institute and head of Chemical Engineering Department in Canal High Institute of Engineering and Technology, Egypt) and Dr Ngonye KEROLETWE (Senior Researcher at the Nanomaterials Division, Botswana Institute for Technology Research and Innovation [BITRI], Botswana).

Do not forget to register and submit your abstract for AMSIC-4 conference that will be held in Addis Ababa, Ethiopia (<http://sam-ptf.com/amsic4/index.html>) from the 5th- 8th November 2024. We look forward to your participation in the next issue of the AMSIC newsletter, and a great year ahead.

If you wish to advertise your organization in AMSIC newsletter for academic or entrepreneurial development in Africa, we are introducing an *Organisation Spotlight* (page 2) section to support your efforts. Please, contact AMSIC leaders for more details on this matter – last page.



SENEENGINEERING INTERNATIONAL S.A is an international engineering consultancy in the field of water, sanitation, environment, agriculture and the development of civil infrastructure.



Located in Dakar (Senegal), the company was founded in 2015 by Dr. Moustapha Sene, a talented professional water and sanitation engineer. The group seeks to promote sustainability by focusing on planning, design and management of water supply, sanitation and environmental projects, thus guaranteeing a better quality of life for Africans.

<https://sen-engineering.com/>

5 Regional Updates

SOUTHERN AFRICA

Republic of South Africa & Malasia

Prof E.N. NXUMALO (University of South Africa in Johannesburg) recently visited the Universiti Teknologi Malaysia, where he is collaborating with Prof W.J. LAU in Malaysia.



Republic of South Africa & Denmark

Prof Heidi RICHARDS from the University of the Witwatersrand and Prof Cejna QUIST-JENSEN from Aalborg University received funding from the Danish Fellowship Agency (DANIDA), to work on a membrane distillation crystallization (MCR) project for 3 years. The project started in 2020 and is now coming to an end.



Dr Lebea Nthunya(L); Prof Heidi RICHARDS (C) and Prof Aamer ALI (R)

The project aims at recovering fresh water and strategic, valuable minerals from unconventional sources (industrial waste streams) by applying novel compact (small spatial footprints) membrane crystallization process that can be operated with solar energy. The project is distributed between the Republic of South Africa and Denmark and with this project, we aim to provide alternatives to the traditional sources of water and raw materials; thus our main outcome is to establish a proof-of-concept at pilot-scale for recovery of fresh water and strategic minerals from waste streams by applying membrane crystallization (MCR) that can be driven with solar energy.

The project will identify suitable wastewater streams (municipal as well as industrial) for water and raw materials recovery and will evaluate the potential of MCR for the purpose. Depending upon the quality of the water, possible applications (drinking purposes, irrigation, sanitation etc.) of recovered water will be identified. Recently, WITS took delivery of the pilot plant and at the same time Dr ALI spent 2 weeks in Johannesburg, South Africa, to assist with the plant set-up and provide training on the unit. The plant will play a key role in the upscaling of lab scale research on various industrial waste streams, which include acid mine drainage and sugar cane extract.



Dr Lebea NTHUNYA (L) and Prof Aamer ALI (R)

7 Regional Updates

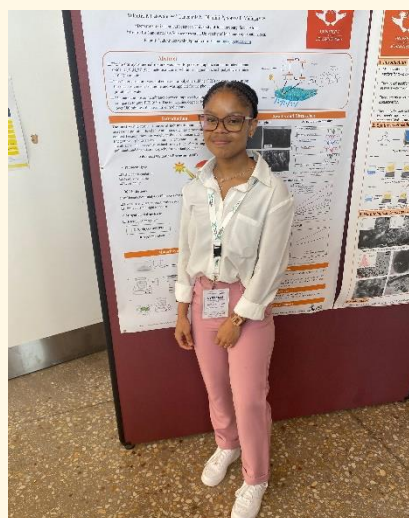
Republic of South Africa

Professor Soraya MALINGA participated in the following:

1. Invited as a speaker at the Euromembrane Science webinar series (4th October 2023)
2. Invited speaker at iNanoWS- UNISA to share her research in the field of membranes science.
3. She also recently delivered a plenary talk at the International Water Association Specialist Conference on Natural Organic Matter (Nom8).
4. Undertook a research visit to the Functional Nanomaterials of Organized Structure Group at the Institute of Nanoscience & Nanotechnology in Greece. Where she was hosted by Dr Michael ARKAS, an expert in the use of dendritic polymers for water purification.
5. Her students Mr Khutso RAMOGALE received 1st place for Oral presentations (MSc) and Ms Valentia LETSWALO was awarded 2nd place for best poster (PhD) at the Nanoscience Young Researchers Symposium at Nelson Mandela University for their research in the membrane field.



Prof Soraya MALINGA



Ms Valentia Letswalo



Mr Khutso RAMOGALE

NOUTHERN AFRICA

The 4th International Conference for Membrane Technology & Its Applications



**4th International Conference
For Membrane Technology
And Its Applications**

28-29 AUGUST 2023
GRAND HOTEL PORT SAID, EGYPT

Organized by
**Flat Sheet Membrane Group in National Research Centre
Egyptian Society of Membrane Technology**

In Cooperation with
**PortSaid University
International Water Technology Association**

Conference Chairman: Prof. Ahmed Shaban, Head of Flat Sheet Membrane Group at National Research Centre, Head of Egyptian Society of Membrane Technology

Conference Co-Chairman:

Prof. Heba Abdallah, Supervisor of Flat Sheet Membrane Group at National Research Centre, Vice-Chairman of Egyptian Society of Membrane Technology

Prof. Marwa Shalaby, Manager of Flat Sheet Membrane Group at National Research Centre, General Secretary of Egyptian Society of Membrane Technology

The 4th International Conference for Membrane Technology & Its Applications Egypt

General Supervisor of the Organizing Committee

Prof. Ayman El-Gendi, Canal High Institute of Engineering & Technology, National Research Centre, Egypt.

Prof. Shereen Kamel Amin, Chemical Engineering Department, National Research Centre, Egypt.

Conference Topics

- 1- Membranes and Artificial Intelligence.
- 2- Membranes and Climate change.
- 3- Environmental Process and Protection.
- 4- Membranes For Desalination.
- 5- Thermal Membranes Processes (Membrane distillation; and Pervaporation).
- 6- Wastewater treatment.
- 7- Membranes Separation Processes.
- 8- Electro membranes (Electrodialysis; RED; and Fuel Cell).
- 9- Membranes and Renewable energy.
- 10- Membranes in Medical applications.

Conference Goals

- Clarify the role of membrane technology in higher-priority areas such as industrial applications, water & wastewater treatment, and water desalination.
- Open new channels for connecting academia with industry in this field.
- Exploring new connections between artificial intelligence tools and membrane technology.
- Establishment of membrane fabrication Industry in Egypt & Africa.
- Broaden a new road for applying membranes to save the environment through control of climate change.

The 4th International Conference for Membrane Technology & Its Applications Egypt

Keynotes and invited speakers in the conference

Prof. Frank Lipnizki, Professor in Chemical Engineering, head of the Membrane Group, the Industrial membrane process research and development centre, at Lund University, Sweden.

Prof. Chedly Tizaoui, full Professor in Chemical Engineering at Swansea University, United Kingdom

Prof. Frank Rögener, Professor of Fluid Process Engineering at Cologne University of Applied Sciences, (TH Köln), Germany

Prof. Raja Ben Amar, Chemical Department of the Faculty of Science of Sfax, University of Sfax; President of African Membrane Society (AMSIC) (Tunisia)

Prof. Dr.-Ing. Miriam Sartor, Professor for Environmental Engineering and Technology at Cologne University of Applied Science (TH Köln), Germany

Prof. Sabu Thomas, Vice Chancellor of Mahatma Gandhi University, Director, School of Energy Materials, India

Dr. Ing. Hubrich, Martin, Research manager in Liquid Media, VDEh-Betriebsforschungsinstitut GmbH, Germany

Dr. Zahia Tigrine, Researcher at Solar Equipment Development Unit (UDES), Renewable Energy Development Center (CDER), Algeria

Dr. Noelia Alonso-Morales, Associate Professor of Chemical Engineering at Autónoma University of Madrid, Spain

Dr. Li-Feng Fang, Doctor of Polymer Science and Engineering, ERC of Membrane and Water Treatment (MOE), Zhejiang University, China

Dr. ZHUOFAN GAO, Changjiang River Scientific Research Institute (CRSRI), China

Eng. Gawel Sołowski, Institute of Fluid Machinery of the Polish Academy of Science, Poland, Specialist at Bingol University in Turkey.

WESTERN AFRICA

Technology promoting in West Africa is evolving satisfactorily. In Senegal, training and research in membrane filtration technologies are proceeding at University Assane Seck of Ziguinchor (UASZ) and University Cheikh Anta Diop of Dakar (UCAD). In fact, the country is one of the pioneers in this part of continent.

Research and Development is making progress due to the connection with semi-industrial world in the country. This has enabled the owners of small agri-food processing units to be assisted by researchers in membrane processes used. In addition, several renewable energy-powered membrane filtration units have been installed in rural areas of Senegal for fluoride and salinity excess reducing in drinking water. These membranes filtrations units have been designed on the basis of several years of research.

Recently, the chemistry department of UASZ has received a pilot plant (showed below – Image: 1 & 2) from ITC – Canary Island as part of a cooperation between the two institutions. The main objectives of the pilot are for training Master's students and research. The acquisition of this pilot led to a Master's thesis realization and doctorate thesis are planned.

The images below illustrate training session with the pilot at UASZ – SENEGAL.



Reverse Osmosis Pilot



Training session in Senegal University Assane Seck of Ziguinchor

In Burkina Faso, the 2iE institute has initiated initiation and training activities in membrane processes. Lectures on membranes have been added to the curriculum and research activities are being carried out on topics related to pollutants removal from drinking water, industrial wastewater treatment by bioreactor membrane.

Two doctoral theses have been completed on the equipment and facilities in the 2iE pilot Hall, which comprises four pilots (MBR, NF/RO, two UF/MF pilots). As part of this dynamic, school-children are welcomed into the laboratories for an early membrane technology introduction.

Contacts have also been established with companies involved in the production of bottled and packaged water using facilities integrating osmosis units for the filtration of the main minerals f.

The pictures below illustrate the activities carried out on membrane pilot at 2iE in Ouagadougou –(Burkina Faso).



Explanation of filtration to school-children



Practical work session with Master's students



PhD candidate performs testing on NF/RO pilot equipment

15 AMSIC Organisation

COLLABORATIONS



DONYATEK and IFTS LEADING B-2-B AND ACADEME-INDUSTRY COLLABORATIONS

Design and validation of a locally designed sand filter for eliminating iron and manganese from drinking water in Mali.

IFTS is involved in one of the DEFIS (*Développons Ensemble une Fabrique à Innovations Solidaires*) projects. DEFIS means (Let's Develop Together a Factory for Solidarity Innovations) with the University of Bordeaux as a partner and its Agenais Master's in Sustainable Development (Master's in Practice and Training Engineering "Educating, training in ecological transition and development sustainable") provided by the Agen branch of the INSPE (*Institut National Supérieur du Professorat et de l'Education*, i.e., the National Higher Institute of Teaching and Education) in Bordeaux!

DEFIS is a program piloted by the *Nouvelle Aquitaine* ID (Innovation Development) NGO and supported by the Region.

DONYATEK's goal is to deliver membrane-filtration-based water treatment solutions to its clients in Mali. IFTS has been tasked to characterize the properties of a new sand filter produced by its Malian customer. Specifically, Dr. Tarik ELJADDI is responsible for managing the scientific and technical support in this project, and he's assisted by IFTS founder Professor Roger BEN AIM.



Sand filter



Sand 1



Sand 2



Clay

According to this study, the two granulometry curves obtained for both types of sands are complementary. Likewise, the coefficient of uniformity for the two materials is close to the reference value for granular media used in the sand filter. On the other hand, for clay it will be necessary to set-up a grinding or sieving method, given its variable grain size. .

Removal efficiency of iron (II) by the clay is low- around 20%. In addition, the adsorption is very fast, and the equilibrium is reached after about 10 min. So, under these experimental conditions, clay is not a suitable adsorbent to remove iron (II).

The filtration of oxidized solutes through sand is very fast. Also, the filtration quality is good even though the column height is just 20 cm. On the other hand, the filtration rate through a mixture of sand and clay is low and filtrate quality is insufficient.

We have established with these results that local materials can be used for fabricating filter products. However, other investigations are necessary to optimize the sand filter design.

- **IFTS (Institut de la Filtration et des Techniques Séparatives)** is expert in filtration and separation techniques (<https://www.ifts-sls.com/>)
- **Donyatek:** is a Malian business committed to providing sustainable water treatment solutions to communities and serving as the primary source for membrane-based filtration systems in Mali (<https://DONYATEK.org/>)

DEFIS prize gave DONYATEK an opportunity to collaborate with IFTS company for characterizing its sand filter product - currently under development.



L to R (top row): Vincent EDERY (IFTS, General Manager) – Abdoulaye DOUCOURE (DONYATEK cofounder) – Tarik ELJADDI (IFTS Scientific Lead). L to R (bottom row): Roger BEN AIM (IFTS founder) - Antoine A DOUYION (DONYATEK Business Developer).

17 AMSIC Organisation



Tarik ELJADDI commented on the productive effort undertaken between DONYATEK and IFTS at the FRANCOFIILT-3 conference in the city of Fez, MOROCCO (May 10-12, 2023)

MOBILITY

Study trip Dr. Maryam Khadim Mbacké, Teacher-researcher at Amadou Mahtar Mbow University in Dakar/Senegal visited Renne, France

Title: Preparation of nanofiltration membranes from millet husk

Introduction:

From September 4 to 28, 2023, I had the honor of being welcomed at the Institute of Chemical Sciences of Rennes, within the Chemistry and Process Engineering Team, placed under the enlightened direction of Prof. Dr. Anthony SZYMCZYK. This stay was an opportunity to conduct innovative research focused on the preparation of nanofiltration membranes from millet husk. This research experience transcends the traditional boundaries of science, exploiting underexploited natural resources to design sustainable solutions in the field of nanofiltration.

Context:

Nanofiltration is a cutting-edge technology that plays a crucial role in the field of separation and purification. Nanofiltration membranes are essential for separating molecules at the nanoscale, paving the way for varied applications such as water treatment, gas purification and chemical separation. However, the constant challenge lies in finding sustainable and eco-friendly materials for manufacturing these membranes.

Millet glume as an innovative resource:

In this context, the research stays at the Institute of Chemical Sciences of Rennes explored the innovative use of millet glume as a basic material for the manufacture of nanofiltration membranes. Millet glume, an often-overlooked agricultural resource (residues left after threshing of millet), has proven to be a promising source due to its unique physicochemical properties. Millet husk is made up of 55.21% carbon, which gives it good valorization potential.

19 AMSIC Organisation

Study trip Dr. Maryam Khadim Mbacké

Methodology:

The membrane manufacturing process follows different stages:

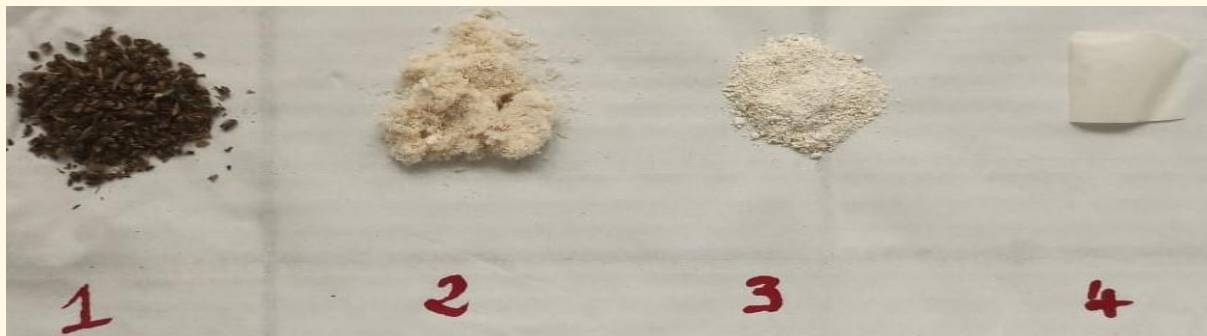
1-hydrolysis of the raw material in a basic medium to extract the cellulose;

2-acetylation of cellulose to obtain cellulose acetate;

3-preparation of polymer solution which will be spread to form the membrane;

4- characterization to determine the physicochemical properties and performance.

Stages 3 and 4 were carried out during this stay.



**1- Millet glume
2- Cellulose**

**3- Cellulose acetate
4- membrane**



Plate installation



Solution is poured



Sample is spread



Drying by integrated suction system to evaporate the solvent

Study trip Dr. Maryam Khadim Mbacké



Precipitation by immersion

The technical platform made available to us allowed us to carry out all the relevant characterization steps (determination of the zeta potential, characterization by infrared spectroscopy, X-ray diffraction, scanning electron microscope, and thermogravimetric analysis).

Preliminary results and implications:

Preliminary results showed that the quality of the membrane obtained depends mainly on the chemical characteristics of the cellulose acetate used. For the next steps it will be a question of optimizing the extraction and acetylation phases to obtain high-performance membranes. Although the full results require further analysis, initial results indicate promising performance of nanofiltration membranes fabricated from millet husk. These findings could pave the way for a new generation of environmentally friendly membranes, reducing dependence on synthetic materials and thus contributing to sustainable development.

Conclusion:

This research study conducted at the *Rennes Institute of Chemical Sciences*, focused on the preparation of nanofiltration membranes from millet husk, demonstrates the continued commitment to innovation and sustainability in the field of chemistry and of process engineering. This pioneering research, under the direction of Prof. Anthony SZYMCZYK, promise to redefine the standards of nanofiltration by exploiting underutilized natural resources, marking a significant advancement towards more environmentally friendly practices in the field of membrane separation.

21 AMSIC Organisation

This collaboration strengthens the links between EMS and AMSIC.



Prof. Dr. Anthony SZYMCZYK



Dr. Maryam Khadim MBACKE

THESES

Lumami Vercus KAPEPULA, defended his PhD thesis at UCLouvain in BELGIUM



Thesis summary

Water scarcity is one of the problems caused by global industrialization. In developing countries, population increase, rural exodus and environmental degradation are major threats to humanity. Inadequate wastewater treatment is a major concern, as it contributes greatly to the destruction of water resources when discharged into the environment.

In the Democratic Republic of Congo, sanitation is not sufficiently developed. The remarkable lack of qualified human resources for the analysis and monitoring of environmental quality, technical and/or financial means does not allow for the implementation of coherent programs adapted to the realities and challenges facing the country.

With this in mind, this study focuses on the application of emerging technology based on reverse osmosis and nanofiltration to treat urban effluent discharged into the north-western coast of Lake Tanganyika (Democratic Republic of Congo).

Two main global objectives were considered in this study, namely: i) the determination of pollution and toxicological risk of pollutants on the northwestern slope of Lake Tanganyika, and ii) the development of a treatment method of domestic and industrial wastewater by commercial membranes, including the preparation of a low-cost membrane to remove pollutants.

Those waters were filtered through commercial reverse osmosis membranes X-20TM, as well as nanofiltration membranes (NF90 and NF270) to remove metal ions. Next, a membrane containing chitosan and the metallic organic framework ZIF-8 (i.e., CS/ZIF-8 mixed matrix membrane) was prepared at the laboratory.

Biography

November 2023: PhD in Science of Engineering and Technology, Université Catholique de Louvain, Belgium.

April 2017 - 2020: PhD candidate in Science of Engineering and Technology, Université du Burundi.

July 2012 - 2014: Master's in environmental science; Orientation: Prevention and remediation of pollution, Université du Burundi.

Sept, 2003-2005: Chemist Université de Kisangani / RDCongo

23 AMSIC Organisation

Ms Adeline MADJISEM, from Chad, defended a Master of Science at PAUWES in Tlemcen, ALGERIA

Ms Adeline MADJISEM completed her master's degree in water policy at the Pan African University institute in Water and Energy Sciences. (PAUWES) in November 2023. It has been an exciting journey, with its ups and downs and a lot of learning and networking. The studies I have completed led to my master's thesis entitled "Assessment of the quality of treated wastewater for agriculture purposes: A water quality Index approach -A case study of Tlemcen wastewater treatment plant, Algeria. This work has been conducted under the supervision of Dr. Madani Bessedik, Climate Change Coordinator at PAUWES and Pr. Nadia Badr, from the University of Alexandria, Egypt – *By Adeline MADJISE*



Dr Samuel OJO defended his PhD thesis at the University Teknologi Malaysia



Samuel OJO successfully defended his thesis in Chemical Engineering (Membrane Technology) with a B1 grade with Merit on the 11th of December 2023.

His PhD research focused on the development of an electron energy storage photocatalytic membrane for oilfield-produced water treatment. He has published his work in Chemical Engineering Journal (CEJ) and others.

25 AMSIC Organisation

Dr. Babatunde Abdulrahmane AMEEN his PhD thesis in Nigeria

Our colleague Babatunde Abdulrahmane AMEEN successfully defended his doctoral thesis (field: Environmental Chemistry) on September 26th, 2023, in the state of LLorin (Nigeria). His research work assessed the environmental impact of heavy metals, polychlorinated biphenyls (PCB), and phatalate esters in municipal dumpsites. Dr Ameen works as Deputy Director, Water Quality and Assurance of Kwara State Corp., in Nigeria. He has been managing key AMSIC administrative activities for several years and regularly volunteers to support students and early career researchers. Our network is greatly appreciative of his insightful messages, inspiring attitude, and we wish him the best of luck in his future endeavors.



Dr Ameen stands in the middle of this picture (with glasses) wearing a white traditional outfit, surrounded by his family and friends.



DOCTORAL MOBILITY: Ms Rita Namoe TABI

I was featured in issue 12 of the AMSIC newsletter and mentioned that I had been in touch with Dr. Mihail BARBOIU, a plenary speaker at the third AMSIC congress, to work with him on my thesis. Fast forward, I have been in Montpellier since February of 2023 to join the group of Prof Mihail BARBOIU at the European Institute of Membranes (IEM) to work on the laboratory experimental phase of my thesis. The thesis started at the Kwame Nkrumah University of Science and Technology (KNUST) and will be submitted and defended there as well. I am currently working on biomimetic nanofiltration membranes that can be used for groundwater desalination. My goal is to utilize this new generation of membranes for the treatment of groundwater sources in Ghana, which is where I live.

Major contamination comes from the geology of the aquifers, and we'll investigate whether the membrane performance is consistent with our predictions. The IEM is a well-equipped facility for membrane research with great people carrying out meaningful research projects and I am glad to be here. I have learnt a lot from my supervisors and colleagues and the experience has been rewarding. Group members have been very welcoming and ready to be of assistance when needed. The city of Montpellier itself is an amazing place and I have had the opportunity to visit some interesting sites, including the beautiful port town of Sète and a hike through the mountains to the sanctuary of Notre-Dame du Suc. I am grateful to the African Membrane Society, Prof Mahail Barbiou, and the funder of my thesis (French National Research Institute for Sustainable Development, through the ACE Partner program) for making this possible and look forward to a productive career in membrane research and applications.

Rita Namoe TABI.

27 Highlight AMSIC Researchers

Professor Ayman ELGENDI is AMSIC Board of Directors- *New Talent and Leadership Committee*, Vice Dean of the Institute and head of Chemical Engineering Department in Canal High Institute of Engineering and Technology

Professor Ayman Elgendi - Google Scholar Citations:

<https://scholar.google.com/citations?user=9uqDz7IAA-AAJ&hl=en>

El-Gendi, Ayman T. - Scopus

<https://www.scopus.com/authid/detail.uri?authorId=15836438600>

Author ID: 15836438600



Ayman ELGENDI, Professor, is Vice Dean of the Institute and head of Chemical Engineering Department in Canal High Institute of Engineering and Technology, Ministry of High Education, Suez, Egypt. He is an **AMSIC Board of Directors- AMSIC New Talent**. He obtained his BSc. And Master from Faculty of Engineering Cairo University Chemical Engineering Department. He obtained his PhD from France – Nancy university-ENSIC-INPL University. He has an experience in the membrane fabrication and application through projects and training in which he participated in a good number of projects. He has 45 international publication articles from 2007 to 2023 in desalination, membrane technology and membrane preparation. He has 8 granted patents from Egyptian Academy of Science & Technology. He has published a book entitled: Ternary phase diagram construction and membrane morphology evaluation, LAB LAMBERT academic publishing, Germany ISBN: 978-3-659-57611-9 (2014). Furthermore, He has published a Chapter 3 in Desalination Updates book, ISBN 978-953-51-2189-3, edited by Robert Y. Ning chapter entitled "Phase Diagram and Membrane Desalination".

As professor at Engineering Research Institute, Chemical Engineering Department, National Research Centre (NRC) Egypt, He is currently working on different research areas, including: water treatment, membrane separation technology, modeling and simulation of chemical engineering processes, supervise Masters and doctoral students, develop a research program, seek external funding for such research, and participate in the **NRC** service and outreach activities.

The main focus of my research is to convert my knowledge into useful and applicable processes to control the industrial impact on environment and to explore new resources and investments; by developing ties with real world throughout collaboration with interested companies. During his PhD study, he was working under the supervision of Professor Eric Favre and Professor Denis Roizard at the University of INPL- Nancy-France. his dissertation was focused on “preparation of polyimide membrane for separation of organic compounds from water”. Also, I was working as a guest scientist in Germany at the Department Reactive Processing of the IPF from 15 June 2013 to 25 June 2013. This work during the progress of the joint project between NRC and IPF in the field of membrane preparation.

He worked as associate prof. at King AbdulAziz University, Faculty of Eng., Chemical Engineering Department Saudi Arabia (2016-2019). He was teaching the following subject; Introduction to chemical engineering (2016), Thermodynamic 1 (2017-2018), and polymer engineering (2019). he teached the course “Water& Wastewater Treatment Technology” at Tabbin Institute for Metallurgical Studies/Egypt from 2013 to 2016. In addition, he has developed a new undergraduate course, entitled: “membrane separation technology”. This course is intended for undergraduate students to be offered in summer training courses taught at NRC – Training Center/Egypt from 2010 to 2015.

Selected publications

1- Published Books

- 1) H Abdallah, A. El-Gendi, Preparation of Polyvinylchloride (PVC) Membranes, Characterization, Modification, Applications, and Mathematical Model, Polyvinylchloride-based Blends pp 175-210. 2022 - Springer, <https://link.springer.com/content/pdf/10.1007%2F978-3-030-78455-3.pdf>
- 2) Book: Ayman El-Gendi, Ternary phase diagram constraction and membrane morphology evaluation, LAB LAMBERT academic publishing, Germany ISBN: 978-3-659-57611-9 (2014)
- 3) Chapter 3 in Desalination Updates, ISBN 978-953-51-2189-3, edited by Robert Y. Ning chapter entitled "Phase Diagram and Membrane Desalination" can be reached by clicking on the link <http://www.intechopen.com/articles/show/title/phase-diagram-and-membrane-desalination>

2- Publications in Journals

1. KK Ahmed S. Abdel-Fatah, Hebat-Allah S. Tohamy, Sayed I. Ahmed, Mohamed A. Youssef, Mohamed R. Mabrouk, Samir Kamel, Farag A. Samhan and Ayman El-Gendi, Anatase-cellulose acetate for reinforced desalination membrane with antibacterial properties, BMC Chemistry (2023) 17:112, <https://doi.org/10.1186/s13065-023-01013-1>
2. Yah Zahang, Ayman Elgendi, Mussel-inspired graphene oxide-based mixed matrix membranes for improving permeability and antifouling property, Separation and Purification Technology Volume 310, 1 April 2023, 123153

Selected publications

3. Miaomiao Zhang, Jinqiu Yuan, Zhuoyu Yin, Niaz Ali Khan, Chao Yang, Mengying Long, Bohui Lyu, Xinda You, Runnan Zhang, Ayman El-Gendi, Hong Wu, Zhongyi Jiang, Organic salt modulated preparation of ultra-thin and loose polyamide nanofiltration membranes with enhanced performance, *Journal of Membrane Science* 680 (2023) 121739
4. Yu Zheng, Jianliang Shen, Jinqiu Yuan, Niaz Ali Khan, Xinda You, Chao Yang, Shiyu Zhang, Ayman El-Gendi, Hong Wu, Runnan Zhang, Zhongyi Jiang, 2D nanosheets seeding layer modulated covalent organic framework membranes for efficient desalination, *Desalination* 532 (2022) 115753
5. Guangzhe Wang, Jinqiu Yuan, Junhui Zhao, Yafei Li, Runnan Zhang, Jianliang Shen, Xiaoyao Wang, Hong Wu, Ayman El-Gendi, Yanlei Su, Zhongyi Jiang, Anionic covalent organic framework engineered high-performance polyamide membrane for divalent anions removal, *Journal of Membrane Science* 650 (2022) 120451
6. Ayman, Elgendi, Shereen Amin, heba abdallah, ashref amin, ahmed Ismail, Experimental Design for Nano-Ceramic Membranes Fabrication and its Performance Model, *Journal of Membrane Science and Research*, 8 (2022) 539537
7. Ayman El-Gendi, A critical review of the preparation, characterization and applications of polyamide membranes, *Desalination and water treatment*, 255 (2022) 120–135
8. A. El-Gendi, A. F. Ghanem, M. A. Yassin, M. H. Abdel rhim, Antifouling and antimicrobial Polyethersulfone/hyperbranched polyester-amide/Ag composite, *The Royal Society of Chemistry RSC Advances*, 10(2020) 24169-24175
9. Elham M. El-Zanati, Eman Farg, Esraa Taha, Ayman El-Gendi and Heba Abdallah, Preparation and characterization of different geometrical shapes of multi-bore hollow fiber membranes and application in vacuum membrane distillation, *Journal of Analytical Science and Technology* 11:47 (2020) 1-16.
10. N Ismail, A. El-Gendi, Hisham A. Essawyc, L.A. Nezam El-Dind, K.A. Abedd, Awad . Ahmede, Impact of Graphene/Graphene Oxide on the Mechanical Properties of Cellulose Acetate Membrane and Promising Natural Seawater Desalination, *Journal of Polymer Engineering*, 2019, 39(9), pp. 794-804
11. Abdallah, H., Shalaby, M.S., El-Gendi, A., Shaban, A.M., Zhu, B.-K, Effectiveness of a coagulation step and polyester support on blend polyvinylchloride membrane formation and performance, *Journal of Polymer Engineering*, 2019
12. El-Zanati, E., Khedr, M., El-Gendi, A., Farg, E., Taha, E., Heat and mass transfer characteristics in vacuum membrane distillation for water desalination, *Desalination and Water Treatment*, 132 (2018) 52–62
13. El-Gendi, A., Favre, E., Roizard, D, Asymmetric polyetherimide membranes (PEI) for nanofiltration treatment, *European Polymer Journal*, 2018, 105, pp. 204-216

Selected publications

3- Patents

Patent mentioned below were Obtaining and registered in the Patent Office, Egyptian Academy of Science & Technology, under the name of:

- 1) Patent no.27538 "Design and development of Polyamide-6 (PA-6) membranes for pervaporation of water /alcohols mixtures", (2016)
- 2) Patent No. 28743 (Distillation Membranes) dated January 29, 2018
- 3) Patent No. 28613 a method for preparing membranes for water desalination) on March 16, 2018
- 4) Patent No. 29086 (a device for preparing flat membrane) on August 6, 2018
- 5) Patent No. 29644 unit for testing the efficiency of polymeric membranes in the desalination of salt water, on February 3, 2020
- 6) Patent No. 29793 Ceramic membranes of different porosity consisting of a single layer of Egyptian material and the method of manufacturing it on June 16, 2020
- 7) No. 1703-2016 from the Egyptian Patent Office) Preparation of polyvinyl chloride and cellulose acetate mixture membranes for desalination on August 14, 2020
- 8) Patent No. 23692 (Preparation of polyamide membrane by casting method) on May 14, 2007



Dr Ngonye KEROLETSWE is a Senior Researcher at the Nanomaterials Division, Botswana Institute for Technology Research and Innovation (BITRI), Botswana. She is a recipient of the prestigious African Research Initiative for Scientific Excellence (ARISE) grant (2022-2027) by the African Academy of Sciences (AAS) and funded by European Union with European Commission and African Union Commission as oversight bodies. As the principal investigator for her granted topic ‘Sustainable Water Filtration using Cellulose based Membranes derived from Local Biomass’, Dr KEROLETSWE’s research is centered around developing cellulose materials for water filtration, which will enable households and/ or communities to purify contaminated water for themselves, thereby increasing their access to clean safe water and contributing to SDG 6.

Her research interests include among others researching into membrane technologies based on cellulose. Cellulose is perceived as the future of materials science since it is abundant, affordable, nontoxic, biodegradable, biocompatible, and by simply changing its size from micron to nanoscale, you usher in attractive properties such as tuneability, enhanced absorbent properties, gas permeability, etc. Dr KEROLETSWE’s team seeks to chemically modify the extracted cellulose from invasive plant species and animal excreta to address different water contaminants like anions, toxic metal ions and salinity. She believes that efforts must be concerted in developing desalination membranes to make the abundant salty water more palatable for human consumption and address shortage of fresh water world-wide, hence her interest in developing cellulose desalination membranes. Dr KEROLETSWE’s studies will open a doorway for further research into the use of cellulose for other applications besides water filtration.

From a young age, she has always had the desire to improve human lives through science. She has taken it upon herself to mentor and share her technical knowledge with rising scientists as well as inspire the girl child by demonstrating that science is for everyone including girls/women. The ARISE grant has given Dr KEROLETSWE an opportunity to meet her aspirations of mentoring upcoming scientists and to contribute to the advancement of science in Africa. She collaborates with universities in her home country, South Africa, and United States of America.

Dr KEROLETSWE holds a PhD Chemistry and MSc Organic Chemistry both from University of Botswana, obtained in 2015 and 2007, respectively. Her Ph.D. research focused on extraction of secondary metabolites from medicinal plants and their bioactivity studies, oil extraction from the seeds of *Baphia massaiensis* and synthesis of heterocycles with antimicrobial activities. She has authored eight (8) research articles and three (3) review articles in different academic journals. She has also carried out reviewer duties. She is a member of Chemical Society of Botswana (CSB), Botswana Academy of Sciences (BAS) and Organization of Women in Science in Developing Countries (OWSD)- Botswana Chapter.

Dr. Moustapha Sene is Founder and CEO of SenEngineering International SA company in Dakar, Senegal - <https://sen-engineering.com/>. A senior expert in water and sanitation, Dr. Sene's impressive educational credentials led him to complete a PhD degree in the field of environmental engineering (2010-2013) at the prestigious University of Hokkaido (Japan), specifically at the School of Engineering. Prior to that, he was awarded a Bachelor's (2007) and Master's degrees (2009), both in water and sanitation at the International Institute of Water and Environmental Engineering (2iE, Burkina Faso). Dr. Moustapha's interests and achievements on sustainability were also acknowledged and awarded by many certificates including those on Environmental Leadership (2012) and a Master's in Sustainability (2013).



As Founder and CEO of SenEngineering International SA since 2015, Dr. Sene possesses more than 15 years of extensive professional experiences in the WASH Sector, during which he served in Senegal, Burkina Faso and Japan.

He has been successfully leading and managing various WASH projects in the field and completing design studies of innovative toilet technologies, brackish and seawater desalination installations, and developing business models to empower low income underserved communities by giving them access to safe water and sanitation. As an International ISO Specialist, Dr. Sene helped establishing new sanitation standards, participated in assessing laboratories in Senegal to determine their capability to carry out tests according to ISO 30500 and ISO 31800, and conducted a market analysis for starting new laboratories in the country. The foundation for his international work with governments, NGOs, international institutions (World Bank, JICA, World Water Forum, AfDB and BMGF), also with the private sector and universities, was shaped by:

- ✓ studies of urban sanitation reforms, development of investment program to achieve the SDG6, flood management program, intensive R&D of development of water and sanitation industries in Sub-Saharan of African,
- ✓ his strong intervention on Mamelles SWRO desalination construction project (100 000 m³/day) in all phases (feasibility, fact –finding mission, Tender assistant and Supervision & Control of works)
- ✓ his current provision of technical and financial assistance to SONES for the Public Private Partnership (PPP) agreement of the Grande Côte seawater desalination project (400 000m³/day), serving as desalination expert and technical coordinator for the mission.

Dr. Sene's strong dedication to entrepreneurship and leadership and unwavering commitment to the emergence of a strong water and sanitation industry in Senegal and West Africa have recently been recognized at the international level. In December 2022 in Dubai, he was awarded Afribusiness winning prize, as "Engaged & Inspiring Entrepreneur / Senegal, in field of water, sanitation and sustainable development". He was recently recognized as one of the "50 Most Influential People in West and North Africa" by Influence Magazine, Conakry, 2023, under the category «Special Award for Innovation and Technology».

Dr Idil MOUHOUED ELMI is a senior lecturer in chemistry at the University of Djibouti. From 2011 to 2016, she worked as an Assistant Professor in Chemistry at the Faculty of Sciences. January 2016, she obtained her Ph.D degree in Process Engineering at the *Institut des Sciences Chimiques de Rennes* from the University of Rennes 1 (France). Her research interests encompass the surface characterization of materials, transport modeling, and membrane processes for water purification. She has a keen interest in water desalination using renewable energy sources (such as solar energy), wastewater treatment systems, water qualitative analyses, as well as environmental chemistry (Djibouti mangroves ecosystem studies).

From 2019 to 2025, she is one of the researchers (leader of group 1) of the SATREPS project (supported by Japan Science and Technology Agency and Japan International Cooperation Agency) in collaboration with the Tokyo University



Publications

1. Elmi Idil Mouhoued, Yasuhiro Asakura, Mohamed Mohamed-Awal Abdillahi, Ko Hinokidani, Yacin Mouhoued Elmi, Ibrahim Souleiman Abdallah, Sawahiko Shimada, Hassan Ali Barkad, Evaluation of Physicochemical Quality of some bottled water consumed in Djibouti City, Submitted september 2023 to Journal of Arid Land Studies.
2. Elmi Idil Mouhoued, Mohamed-awal Abdillahi Mohamed, Abdourachid Ibrahim Igueh, Study of Different Parameters Affecting the Productivity of Solar Still for Seawater Desalination under Djiboutian Climate, Energy and Power Engineering, 2022, 14, 201-216.
3. Mohamed-awal A. Mohamed, Idil M. Elmi, Abdoul-Nasser D. Egueh, Abdourachid I. Igueh, Daha H. Daher, Design, Construction and Experimental Study of a Solar Still for Brackish Water Purification under Djiboutian Climate, International Journal of Engineering and Technology, 2021, 13 (3):116-127.

4. Elmi Idil Mouhoumed, Mohamed-awal Abdillahi Mohamed, Yacin Mouhoumed Elmi, Choukri Osman Doubad, Egeuh Abdoul-Nasser Dirieh, Classification of Various Bottled Mineral Waters Marketed in Djibouti, *World Journal of Engineering and Technology*, 2020, 08 (04):720-738.
5. E. Idil Mouhoumed, A. Szymczyk, A. Schäfer, L. Paugam, Y.H. La, Physico-chemical characterization of polyamide NF / RO membranes: insight from streaming current measurements, *J. Membr. Sci* 461 (2014) 130-138.
6. Y.H. La, J. Diep, R. Al-Rasheed, M. Nassar, E. Idil Mouhoumed, A. Szymczyk, G. Dubois, The Effect of Cross-contamination in the Sequential Interfacial Polymerization on the RO performance of Polyamide Bi-layer Membranes, *J. Membr. Sci* 466 (2014) 348-356.

Want to learn about AMSIC?

Visit:

<http://www.sam-ptf.com/index.html>

Become AMSIC member?

Send applications to both contacts:

- ✓ AMSIC President, Prof. Raja Ben Amar:
benamar.raja@yahoo.com
 - ✓ AMSIC General Secretary Dr. Abaynesh Y.
Gebreyohannes: abayneshy@yahoo.com
-

AMSIC Newsletter Submissions

Please send news, announcements, and other contributions for the newsletter to the editor, Ms. Sara Chergaoui and Prof Soraya

Malinga: sara.chergaoui@uclouvain.be, smalinga@uj.ac.za

Your contribution shall be included in the next issue of the newsletter.